MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2015/2016

PAM0135 –ALGEBRA

(Foundation in Information Technology / Life Sciences)

03 JUNE 2016
3.00 P.M. – 5.00 P.M
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of **TWO** pages excluding the cover page and the Appendix.

2. Answer **FIVE** out of **SIX** questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please write all your answers in the Answer Booklet provided.

4. All necessary working steps **MUST** be shown.

Instruction: Answer **FIVE** out of **SIX** questions.

Question 1 [10 marks]

Solve the equations:

a. $\dfrac{x+1}{(3x+1)(x-5)}+\dfrac{6x}{3x+1}=\dfrac{7}{x-5}$ (4 marks)

b. $2x^4-11x^2-63=0$ (4 marks)

c. $\sqrt[3]{5x-9}-5=0$ (2 marks)

Question 2 [10 marks]

Solve the following inequalities:

a. $\dfrac{7}{2}+\dfrac{8x-3}{6}>\dfrac{13x}{3}$ (2 marks)

b. $\dfrac{7}{2x-5}>\dfrac{3}{x-2}$ (4 marks)

c. $4|2-5x|-9\le 12$ (4 marks)

Question 3 [10 marks]

Given the quadratic function $f(x)=-2x^2+2x+12$.

a. Find the vertex, the x-intercepts, the y-intercept, and the axis of symmetry of the graph of f. (5 marks)

b. Sketch the graph of $y=f(x)$. Show clearly the vertex, the x-intercepts, the y-intercept, and the axis of symmetry on the graph. (3 marks)

c. Determine the domain and the range of $f(x)$. (1 mark)

d. Determine the intervals where f is increasing or decreasing. (1 mark)

Continued...

Question 4 [10 marks]

a. Given the functions $f(x) = x^2 + 2$ and $g(x) = \sqrt{1-3x}$. Find the composite function $f \circ f$ and the inverse function g^{-1}. (4 marks)

b. Given the polynomial function $f(x) = 4x^4 - 83x^2 + 81x - 20$.

i. Using the Factor Theorem, show that $(x+5)$ and $(x-4)$ are factors of f. (1 mark)

ii. Factorize $f(x)$ completely, and solve the equation $f(x) = 0$. (5 marks)

Question 5 [10 marks]

a. Sketch the graph of the function $f(x) = 2^{x-3} - 1$. Show clearly at least 2 points on the graph and the horizontal asymptote. State the domain and range of f. (4 marks)

b. Solve the equations:

i. $6^{2x-1} = 5^{x+1}$ (3 marks)

ii. $e^{2x} + 6e^x - 16 = 0$ (3 marks)

Question 6 [10 marks]

a. In the expansion of $(5m - 6n)^{10}$, find

i. the coefficient of $m^4 n^6$. (2 marks)

ii. the first three terms of the expansion. (4 marks)

b. Given that the third term and the sixth term of a geometric sequence are -63 and 1701 respectively. Find the first term and the common ratio of the geometric sequence. Hence, find the sum of the first six terms of the sequence. (4 marks)

End of Page

APPENDIX

$a^2 - b^2 = (a-b)(a+b)$

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$

$a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

$(a+b)^2 = a^2 + 2ab + b^2$

$(a-b)^2 = a^2 - 2ab + b^2$

$(a-b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$

$(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$

$\log_b b = 1$

$\log_b 1 = 0$

$\log_b (MN) = \log_b M + \log_b N$

$\log_b \left(\frac{M}{N}\right) = \log_b M - \log_b N$

$\log_b M^p = p \log_b M$

$\log_b M = \frac{\log_a M}{\log_a b}$

$a_n = a_1 + (n-1)d$

$a_n = a_1 r^{n-1}$

$S_n = \frac{n}{2}(2a_1 + (n-1)d) = \frac{n}{2}(a_1 + a_n)$

$S_n = \frac{a_1(1-r^n)}{1-r}$

$S = \frac{a_1}{1-r}$, infinite sum $|r| < 1$